

# Chapter 7: PNFS Namespace

## 7.1 UNIX Commands You can Use in PNFS Space

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Data files do not actually reside in `/pnfs` namespace, and errors occur on attempts to read or write the content of the files, or to manipulate the content or location in any way. Therefore, UNIX commands such as **cat**, **more**, **less**, **grep**, **head**, **tail**, **wc**, **od**, **file**, **cp**, and so on, fail if you run them on files listed under `/pnfs`. However, virtually any non-I/O UNIX command can be used in `/pnfs` namespace. For these commands, the standard options work in the standard way. Commands that you may find useful include:

• <code>ls</code>	• <code>pwd</code>
• <code>mv</code> and <code>mkdir</code>	• <code>find</code>
• <code>rm</code> and <code>rmdir</code>	• <code>cd</code>
• <code>mkdir</code>	• <code>ln</code> (hard links only) <sup>a</sup>
• <code>stat</code> <sup>b</sup>	

a. For `ln`, hard links must be used to ensure that all the metadata information is linked; symbolic links do not work properly .

b. `Stat` is not available in all operating systems.

## 7.2 About PNFS Tags

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Before files can be written to tape, Enstore needs to know where and how to write them. Pnfs uses tag files (usually just called tags) in `/pnfs` namespace to specify this type of configuration information, and **enclp** communicates the information to Enstore. Tags are associated with directories in `/pnfs` space,

not with any specific file, and thus apply to all files within a given directory. As a new directory in `/pnfs` namespace is created, it inherits the tags of its parent directory.

## 7.2.1 Tag Listing

The tags include:

file-family	This tag determines the file family associated with all files in this directory. See section 1.3.1 <i>File Family</i> for information on file families.
file-family-width	This tag determines the file family width associated with all files in this directory. See section 1.3.2 <i>File Family Width</i> for information on file family width.
file-family-wrapper	This tag determines the file family wrapper associated with all files in this directory. See section 1.3.3 <i>File Family Wrapper</i> for information on file family wrappers. This tag is optional; the default is <code>cpio_odc</code> .
library	This tag determines the virtual library associated with all files in this directory.
storage-group	This tag determines the storage group associated with all files in this directory, and shows up as your experiment's top level directory under <code>/pnfs</code> . Typically, one storage group is associated with an entire experiment. A storage group is assigned to each experiment by the Enstore administrators. Users never change this tag.

## 7.2.2 How to View Tags

Off-site users cannot mount `pnfs`, and therefore cannot see tags. On-site users: to see the values of the tags for a given directory, first setup **encp** (with qualifier, see section 3.1.2 *Setup encp*) then **cd** to the `/pnfs` subdirectory of interest and enter the command:

```
% enstore pnfs --tags
```

```
.(tag)(file_family) = dcache
.(tag)(file_family_width) = 1
.(tag)(file_family_wrapper) = cpio_odc
.(tag)(library) = eagle
.(tag)(storage_group) = test
-rw-rw-r-- 11 root sys 6 Jul 26 10:22 .(tag)(file_family)
-rw-rw-r-- 11 root sys 1 May 5 2000 .(tag)(file_family_width)
-rw-rw-r-- 11 root sys 8 May 5 2000 .(tag)(file_family_wrapp)
-rw-rw-r-- 11 root sys 5 May 5 2000 .(tag)(library)
```

```
-rw-r--r-- 11 root sys 4 Jul 26 10:20 .(tag)(storage_group)
```

The output first lists the (hidden) tag files and their values, then lists the files again in long format.

## 7.3 Changing PNFS Tags

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### 7.3.1 Caveat

Tags (i.e., tag values) can be changed if the standard UNIX permissions on them allow for it. However, thought and planning should go into structuring the storage of an experiment's data, and users should not change any tags without consulting the people in their experiment responsible for this task. The storage group tag cannot be changed.

### 7.3.2 Permissions and Ownership

The permissions shown in the output of the **enstore pnfs --tags** command (see section 7.2.2 *How to View Tags*) indicate whether you can change the value of the tag or not. To change a tag, you need to use the **enstore pnfs** command with one of the options **--tagchown** or **--tagchmod** to change ownership or permissions, respectively (see section 5.5 *enstore pnfs*).

For example, to add write permission for “other” to the permissions for the file family tag, you’d enter (include the quotes):

```
% enstore pnfs --tagchmod o+w file_family
```

or you can use the absolute form for the mode, e.g.,

```
% enstore pnfs --tagchmod [0]646 file_family
```

To change the ownership, run a command like either of the following, using username or username.group:

```
% enstore pnfs --tagchown zalokar file_family
```

```
% enstore pnfs --tagchown zalokar.g023 file_family
```

### 7.3.3 How to Reset a Tag

To reset one or more tags on a directory, **cd** to that directory and run the **enstore pnfs** command with the option for the tag you want to reset. See the listing in section 5.5 *enstore pnfs*. E.g., to reset the file family to myfilefamily, enter:

```
% enstore pnfs --file-family <myfilefamily>
```

Run the **enstore pnfs --tags** command to see the change.